PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

CONNORS et al.

Art Unit: 1723

Application No.: 09/091,508

Examiner: M. Ocampo

Filed: October 30, 1998

For: SEPARATION ELEMENTS

CLAIMS PENDING AFTER AMENDMENT IN RESPONSE TO THE OFFICIAL ACTION MAILED MARCH 7, 2001

1. A separation element for separating one or more components from a fluid flowing through the separation element, the separation element comprising:

(a) two or more hollow pleated pack sections, each pack section having a plurality of pleats, wherein the plurality of pleats includes roots, crowns, legs extending between the routes and the crowns, an inner periphery at the roots defining an upstream side, and an outer periphery at the crowns defining a downside side and wherein each pleat has a height h greater than (D-d)/2 where D is the outer diameter at the outer periphery of the plurality of pleats and d is the inner diameter at the inner periphery of the plurality of pleats, a retainer disclosed around the pleats, first and second ends, and a porous medium comprising a polymeric material or a glass fiber material;

b) joiner caps attached to at least one end of each of the two or more pack sections, adjacent joiner caps being connected to coaxially secure the pack sections and joiner caps into a hollow separation arrangement being at least about 40 inches in length and having an interior diameter of at least of about 2 inches; and

(c) first and second end caps attached to the hollow separation arrangement, wherein one of the first and second end caps comprises a seal having an outside diameter greater than the largest outside diameter of the hollow separation arrangement, the joiner caps and the end caps including a polymeric, thermoplastic or elastomeric material.

2. A separation element for separating one or more components from a fluid flowing through the separation element, the separation element comprising:

(a) a hollow pleated pack having a plurality of pleats, wherein the plurality of pleats includes roots, crowns, legs extending between the roots and the crowns, an inner periphery at the roots defining an upstream side, and an outer periphery at the crowns defining a downstream side and wherein each pleat has a height h greater (D-d)/2 where D is the outer diameter at the outer periphery of the pleated pack and d is the inner diameter at the inner periphery of the pleated pack, a retainer disposed around the pleats, first and second ends, and a porous medium comprising a polymeric material or a glass fiber material, the hollow pleated pack being at least about 40 inches in length and having an interior diameter of at least about 2 inches; and

(b) first and second end caps, each end cap being connected to an end of the pack, wherein one of the first and second end caps includes a seal having a larger outside diameter than the largest outside diameter of the hollow pleated pack and the other end cap and wherein the end caps include a polymeric, thermoplastic or elastomeric material.

3. A separation element comprising:

(a) a pleated pack including a porous medium and a first end and having a length greater than about 40 inches and an interior diameter greater than about 2 inches; and

(b) an end cap including a first segment and a second segment mounted to the first end of the pack, wherein the first and second segments are slidably arranged with one another and wherein the end cap is extendable from a first position in which the first and second segments are spaced a first distance from each other to a second position in which the first and second segments move away from one another and are spaced a second distance from each other, the second distance being greater than the first distance.

4. A separation element comprising:

(a) a pack including a porous medium and a first end; and

(b) an end cap having a first segment, a second segment mounted to the first end of the pack, and a sealing member coupled to at least one of the first and second segments, the first segment slidably engaging the second segment such that the first

segment is movable between first and second positions, wherein in the first position, the sealing member is relaxed, and in the second position, the sealing member is compressed by the first and second segments, thereby energizing the sealing member, and has an outer diameter greater than the outer diameter of the second segment of the end cap.

14. The separation element of claim 1 wherein each pack section includes a core disposed along the inner periphery of the pleats.

15. The separation element of claim 1 wherein each pack section is free of a core.

16. The separation element of claim 1 wherein the end cap having the seal comprises an open end cap including a substantially cylindrical configuration having an outer periphery and a channel circumferentially arranged in the outer periphery, the seal being positioned in the channel.

17. The separation element of claim 16 wherein each pack section is free of a core.

18. The separation element of claim 1 wherein the legs of the pleats are in intimate contact along substantially the entire height of the pleats.

19. The separation element of claim 2 wherein the hollow pleated pack includes a core disposed along the inner periphery of the pleats.

20. The separation element of claim 2 wherein the hollow pleated pack is free of a core.

21. The separation element of claim 2 wherein the end cap including the seal comprises an open end cap including a substantially cylindrical configuration having an outer periphery and a channel circumferentially arranged in the outer periphery, the seal being positioned in the channel.

22. The separation element of claim 21 wherein the hollow pleated pack is free of a core.

23. The separation element of claim 2 wherein the legs of the pleats are in intimate contact along substantially the entire height of the pleats.

24. The separation element of claim 3 wherein the second segment includes a sealing structure comprising a face seal.

25. The separation element of claim 24 wherein the end cap comprises an open end cap and the sealing structure has the largest outside diameter of the separation element.

26. The separation element of claim 3 wherein the end cap comprises an open end cap including an annular gap formed between the first and second segments and a sealing member disposed in the gap.